

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1
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Comment on nhess-2022-58

Anonymous Referee #1

Referee comment on "Improving the predictability of the Qendresa Medicane by the assimilation of conventional and atmospheric motion vector observations. Storm-scale analysis and short-range forecast" by Diego S. Carrió, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-58-RC1>, 2022

The manuscript presents a study to evaluate the impact of assimilation of atmospheric motion vectors and conventional observations with an ensemble Kalman filter to improve forecast of medicane Qendresa.

The manuscript is well written and the numerical experiments well designed.

Main remarks are as follow:

- The introduction requires a brief general presentation of numerical weather prediction and data assimilation, before any detailed discussion.
- When referring to present weather prediction systems/models more details should be included: are these operational forecasts or case studies? Are these global coarse resolution or mesoscale convection permitting models? Do they assimilate observations and how?
- The ensemble was designed to include different sets physical parameterizations among the different ensemble members (if I understood correctly). However, no discussion on how different sets of parameterizations performed is discussed. Can you identify sets of parameterizations that lead to better/worse results in a systematic way? If so, I suggest also drawing them with a different color in the plots.
- The use of the global model for initial and boundary conditions is mentioned in the manuscript, however, no discussion is provided regarding the improvement that I supposed was achieved by the WRF model and WRF-DART simulations, both due to better resolution and assimilation at high resolution. This should be discussed in the manuscript and lines depicting the global model results should be added in the plots.

Minor remarks:

Line 8: with operational models? At what resolution? Lower than your resolution?

Line 16: Is your high resolution the main factor of improvement or the data assimilation?

Line 18: A short introduction of NWP and data assimilation should be provided before directly jumping into detailed review of data assimilation literature

Line 36: This part of the sentence is not clear. May be: Due to the limited oceanic and maritime coverage of meteorological radars,....

Line 39: May be: observational coverage of

Line 50: These are not so recent. Are there any more recent references?

Line 54: It should be stated that one of the weaknesses of retrievals is the need for a first guess or additional atmospheric information, usually coming from short model forecasts that may be in turn too coarse and inaccurate. Some references should be included here.

Line 61: any more recent reference?

Line 99: These were not assimilated in previous studies? Are these assimilated in operational forecasts that issued real-time forecasts of Qendresa? If so, they did not improve forecasts? If so, for what reason? Coarse resolution, not efficient data assimilation technique?

Line 135: can you please further describe how this was done?

Line 140: which models? Operational? which ones? Other studies? Please cite as necessary.

Line 158: why was one-way nesting chosen?

Line 193: I think that this sentence should appear earlier in the manuscript (where the aim of the study is described) and in the abstract

Line 308: I think that only a short paragraph with aim and main results should be here and the rest as supplementary material.

Line 351: Why? It has no data assimilation

Line 392: This requires further description. Do the results using this technique add further value? I wonder whether this is really needed. As written now it is unclear to me.

Line 401: All of these are very low probabilities and the kernel method was not explained, therefore the reader cannot understand the importance of these figures

Line 457: Are RSAMV assimilated too?